



PHYTOCHEMICAL ANALYSIS OF THE AQUEOUS LEAF EXTRACT OF *RAUWOLFIA VOMITORIA* AFZEL

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ABSTRACT

Rauwolfia vomitoria Afzel is a hermaphroditic shrub specie with oval or oblong shiny green leaves which grow in whorls of three. The common names include; Poison devil's pepper, African serpent wood etc, traditional names for the plant includes Asofeyeje (Yoruba), Ira or Akanta (Igbo) and Wadda (Hausa). The shrub is distributed geographically across the globe. Various component of the plant has been reported to yield varying degrees of therapeutic results and adverse effects. The aim of this study was centered on the phytochemical analysis of the aqueous leaf extract of *Rauwolfia vomitoria* Afzel. The fresh leaves of *Rauwolfia vomitoria* Afzel was obtained from a forest in Enugu State, Nigeria. The sun dried leaves were pulverized. The aqueous extract of *Rauwolfia vomitoria* Afzel was obtained from the pulverized leaves by the 'Rotary Extraction Method' following standard operating protocols. Results of the phytochemical analysis of the plant carried out in the Department of Pharmacognosy and Phytotherapy, Faculty of Pharmaceutical Sciences, University of Port revealed; the most abundant phytochemical constituents to be alkaloids, flavonoids and saponin, the more abundant phytochemical constituents to be triterpenoid/steroids, carbohydrates and cardenolide while the least abundant phytochemical constituent was fixed oils. However, tannins and anthraquinone were absent. The study however revealed that the availability and presence of various phytochemical component is plant-component, specie and geographically dependent.

KEYWORDS: Phytochemical analysis, aqueous leaf extract, *Rauwolfia vomitoria* Afzel.

INTRODUCTION

Rauwolfia vomitoria Afzel is a plant (shrub) which varies in height. The oval or oblong shiny green leaves grow in whorls of three, elliptic - acuminate to broadly lanceolate; about 8-12 cm long and 3-6 cm wide.^[1,2] It has straight veining and a cluster of inconspicuous white or greenish minute, sweet scented and somewhat hairy (inside) flowers. Fruits are fleshy and greenish with the ripped ones red in colour. *R.vomitoria* is hermaphroditic specie; the wood is white when freshly cut, changes to rose colour on exposure.^[3] The branches are whorl and the nodes enlarged and lumpy. The roots are tuberous with pale brown cork.

The Generic name *Rauwolfia* commemorates a 16th century German physician, Leinhart Rauwolf, who travelled over the world collecting and documenting medicine.^[4] The specific epithet *vomitoria* refers to the purgative and emetic properties of the bark. The common names include; Poison devil's pepper, African serpent wood, African snake root or Swizzle stick (the young twigs with the side branches trimmed short serve as

mixers for drinks hence the English name, swizzle stick). In local Nigerian languages, it is called *Asofeyeje* (Yoruba), *Ira* or *Akanta*^[5] or *Ntu oku*^[6] (Igbo) and *Wadda* (Hausa)^[7], *Eto mmoneba* (Efik), *Utoenyi* (Ibibio).^[8]

It has also been known to be called *Omuatabusinde/kinyabusinde* in Kikuku, Tanzania.^[9] The Indian specie is called *Rauwolfia serpentine*^[5], other specie include *Rauwolfia sandwicense*. The African specie of the plant, *Rauwolfia vomitoria* has twice the amount of reserpine of the Indian specie, *Rauwolfia serpentine*.^[10]

The shrub is distributed geographically amongst Tropical Africa, Tropical Forest of Pacific, South America and Asia. In Nigeria, it is found near Lagos, Abeokuta, Ibadan, Calabar, Akamkpa, Odukpani local government area of Cross River State^[1,2] and Eastern part of the country^[6] and other places.

Taxonomic Hierachy

Rauwolfia vomitoria Afzel has been classified thus:

Kingdom	Plantae - Plants
Subkingdom	Tacheobionta – Vascular plants
Superdivision	Spermatophyta – Seed plants
Division	Magnoliophyta – Flowering plants
Class	Magnoliopsida
Subclass	Asteridae
Order	Gentianales
Family	Apocynaceae – Dogbane family
Genus	<i>Rauwolfia</i> L. - Devil's pepper
Specie	<i>Rauwolfia vomitoria</i> Afzelius - Poison devil's pepper



The major phytochemical constituents of this plant include; alkaloids, glycosides, polyphenols and reducing sugars.^[11] The indole alkaloid with yohimbane skeleton include; yohimbine, reserpine, rescinnamine, ajmaline, and ajmalicine, they are identified as biologically active.^[12,13]

Rauwolfia vomitoria has been reported to be a raw material for the extraction of isolated alkaloids, preparation of extract with standard alkaloid content and above all a major source of the bioactive substance - reserpine implicated in the treatment of insanity and hypertension.^[14,15] The leaves of *R.vomitoria* has been postulated to contain the important hypotensive and sedative alkaloids – reserpine and rescinnamine, as well as several other indole alkaloids and the root of this Apocynaceous plant represent very important commercial source of reserpine.^[16] Reserpine is also a well-known antihypertensive, antipsychotic and sedative alkaloid.

Reserpine, one of the alkaloids of the specie, had been reported to be the major constituent of antihypertensive drugs^[17] used for the management of hypertension, schizophrenia and psychiatric disorders^[18] and even thought to be beneficial in cases of Huntington disease. It has also been reported to be useful in the treatment of dysentery, jaundice, cerebral cramp and gastrointestinal disorders.

Side effect of the medication containing reserpine – a phytochemical constituent, includes drowsiness, nasal congestion, salivary and gastric hyper secretion, paradoxical anxiety and retention of water and sodium ion (Na⁺). Overdose may cause respiratory depression, slowed heartbeat, hypotension, confusion, tremors,

convulsions and gastrointestinal distress. Contraindications for using reserpine are depression, peptic ulcer and hypersensitivity to the alkaloid. The adverse effect of this plant includes; decreased heart rate and blood pressure, which is due to the dilation of blood vessels. It also causes low sex drive, increased appetite, weight loss, swelling, stomach upset, hallucinations, poor co-ordination, dizziness, impairment of physical abilities and psychotic depression^[19] and distortion of cerebellar cells and layers among them.^[20]

Generally, the alkaloids present in *R.vomitoria* when taken along with other plant active agents are less toxic than when taken alone, only a single report revealed a significant reduction of red blood cell which may predispose one to anaemia.^[21] Reserpine, an active ingredient is known to be associated with extra-pyramidal side effects such as orofacial dyskinesia and tremor.^[22]

The effect of the plant in pregnancy has not been established.

MATERIALS AND METHODS

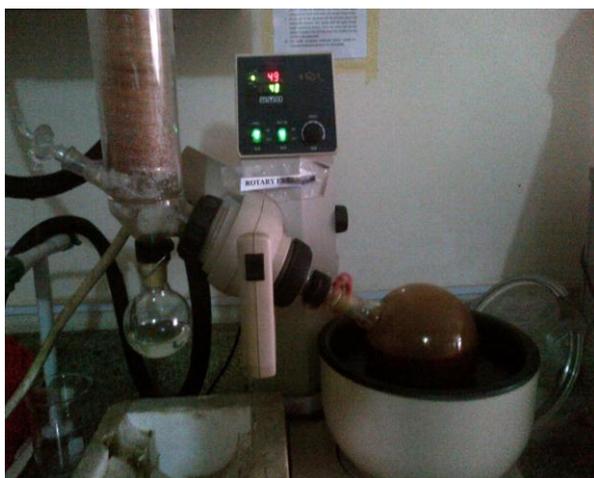
Collection, identification and preparation of plant material

Fresh whole leaves of *Rauwolfia vomitoria* Afzel was obtained from a forest in Onu-Akpaka, Amoji village in Ndiagu, Akpugo, Nkanu West Local Government Area of Enugu State, Nigeria. It was identified and authenticated in a Herbarium, Plant Science Department, University of Port Harcourt, Rivers State. The fresh leaves was washed off dirt and dust subjected to constant sunlight as a means of drying. This method was adopted in order to minimize alterations, loss and

damage of phytochemical components. The sundried leaves were pulverized using an industrial grinding machine.

Obtaining the aqueous leaf extract

The aqueous extract of *Rauwolfia vomitoria Afzel* was obtained from the pulverized (ground) leaves of *R.vomitoria* by the 'Rotary Extraction Method'. The pulverized leaves of *R.vomitoria* were soaked in distilled water for 72 hours (3 days) in a plastic container with lid. The mixture was then sieved using Wattman's filter paper in preparation for the rotary extraction. The filtrate was then poured into the round bottom bottom bottle and fitted to the rotary evaporator.



Phytochemical analysis

The phytochemical analysis of the plant was carried out in the Department of Pharmacognosy and Phytotherapy, Faculty of Pharmaceutical Sciences, University of Port Harcourt to determine the chemical constituent of *Rauwolfia vomitoria Afzel*.

RESULTS

Phytochemical analysis

Table analyzing the phytochemical constituents of *rauwolfia vomitoria afzel*

Sample: *Rauwolfia vomitoria Afzel*.

Substance	Inference
Alkaloids	+++
Flavonoids	+++
Tannins	--
Anthraquinone	--
Triterpenoid/Steroids	++
Fixed oils	+
Carbohydrates	++
Cardenolide	++
Saponins	+++

Key

+++ Most abundant
 ++ More abundant
 + Abundant
 -- Absent

DISCUSSIONS

The results obtained from the phytochemical analysis of the aqueous leaf extract of *rauwolfia vomitoria afzel* revealed that the most abundant phytochemical constituents are alkaloids, flavonoids and saponin, the more abundant constituents are Triterpenoid/Steroids, carbohydrates and cardenolide while the abundant constituent is fixed oils. Anthraquinone and tannins is absent. This is in alignment with what was reported by a researcher. The report revealed the major phytochemical constituents of the plant to be alkaloids, glycosides, polyphenols and reducing sugars^[11] though there was no specification on the part of the plant that was used. However it was also reported that the indole alkaloid with yohimbane skeleton include; yohimbine, reserpine, rescinnamine, ajmaline, and ajmalicine, they are identified as biologically active.^[12,13]

Other chemical constituent of *Rauwolfia vomitoria* include Canembine, Corynanthine, Seredine, Yohimbine, Mitoridine, Purpeline, Pelirine, Semperflorine, Ajmaline, Raunticine, Raujemedine, Samatine, Deserpidine, Ajmalidine, Rauwolfine, Obscuridine, Obscurine, Rauvoxinine, Mitoridine, Vomilenine, Seredamine, Tetraphyllicine, Ajmalicine, Reserpiline, Reserpinine, Sarpagine, Vincamajine, Neoreserpiline, Aricine, Picrinine, Sandwichine, Rauwolfinine, Raucaffriline, Raunamine etc.^[17] None of these cocnstituents identified above was present in the result of this research. The reason may be attributed to specie factor or plant part or perhaps the influence of topography and geographical distribution though there were no specifications with regards to informations on specie or plant part used.

A report claims that the root bark constitute about 40%-50% of the whole root and alkaloid content vary from 1.7%-3%.^[23] It was also postulated that the root contains the alkaloids Ophioxylin, resin, starch and wax.^[23] He also explained that five crystalline alkaloids – Ajmaline, Ajmalicine, Serpentine, Serpentinine and Yohimbine could be isolated from the roots. Other constituent identified include phytosterol, oleic and unsaturated alcohols.^[23]

CONCLUSION

The study revealed that the availability and presence of various phytochemical component in *Rauwolfia vomitoria Afzel* is plant-component (part), specie and geographically dependent.

CONFLICT OF INTEREST

There is no conflict of interest.

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